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Online collaboration and cooperation: The recurring importance of evidence, rationale and viability

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Abstract This paper investigates collaboration in teaching and learning and draws out implications for the promotion of collaboration within online environments. It is divided into four sections. First the case for collaboration, including specifically cooperative approaches, is explored. This case revolves around the impact of collaboration on the quality of learning and on learning outcomes. Collaboration is seen as constrained by context but, if structured and rewarded, it will bring important motivational and cognitive benefits. Next, the case for *online* collaboration is examined. This is based on longstanding arguments about the benefits of working together albeit in an environment which offers greater reach; a mix of media; and archives of interaction. The third section of the paper compares perspectives on online collaboration with a longer tradition of research into collaboration in general; it critiques the idea that online mediation offers a paradigm change in teaching and learning. The fourth section of the paper considers future directions for promoting online collaboration.

Keywords Cooperation · Collaboration · Knowledge · Teaching and learning

1 Introduction

Forms of online collaboration (hereafter OC) in education have been consistently advocated in contributions ranging from Hiltz and Turoff (1978); Mason and Kaye (1989); Garrison (1993); Harasim (1996; 2000); McConnell (2000); Scardamalia and Bereiter (2006) through to more recent work in respect to MOOCs such as Siemens (2005), Conole (2013) and, more generally, Beetham and Sharpe (2013). Collaboration (and for brevity here collaboration covers specifically cooperative approaches too) is not, however, new; there is a tradition of thinking about collaboration and the benefits it

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brings. Indeed those promoting OC routinely draw on this tradition by referencing, say, Dewey (e.g. Garrison 2007); Habermas (e.g. Boyd 1996; Cecez-Kecmanovic and Webb (2000); Johnson and Johnson (e.g. McConnell 2000); and McMillan and Chavis's (1986) work on community (Rovai and Jordan 2004). Nonetheless, there have been few attempts to explicitly compare OC with the 'traditional' or longer view of collaboration. This is a significant gap as many of the opportunities and challenges which OC throws up might turn out to be recurring ones rather than unique to online environments. Thus this paper is concerned, firstly, with the 'long' view of collaboration. In other words how and why have forms of collaboration been promoted over the last hundred or so years?; What benefits / difficulties has collaboration been seen as offering?; How has collaborative learning been evaluated?. The paper, secondly, goes on to look at collaboration in specifically online environments before considering, thirdly, to what extent OC should be seen as marking a paradigm shift in teaching and learning. Finally, the paper draws out tensions in the case for collaboration and suggests a recalibration of the way that OC is promoted.

2 The long view: What is collaboration and cooperation? How and why has it been promoted?

Collaboration and cooperation have often been used loosely but many see a distinction between collaboration as a process leading to jointly constructed artefacts or achievements and cooperation as a process leading to an assembled product. As put by Dillenbourg (1999: 8)

In cooperation, partners split the work, solve sub-tasks individually and then assemble the partial results into the final output. In collaboration, partners do the work 'together.'

However the terms collaboration and cooperation are not used consistently and Johnson and Johnson (1988, 1989), whose work has been hugely influential in this field, offered a strong form of cooperation in which individuals seek outcomes that are both beneficial to themselves and beneficial for all other group members. Johnson and Johnson contrast cooperative learning with competitive learning and with individualistic learning in which students work by themselves.

2.1 Benefits of collaboration

Perhaps the most influential marshalling of evidence in favour of specifically cooperative approaches to learning was undertaken by Johnson and Johnson who repeatedly claimed that systematic review showed that a cooperative approach led to statistically significant improved learning outcomes (e.g. Johnson and Johnson 1989; Johnson et al. 1998). The explanation for these gains was that there were cognitive processes involved in collaboration, for example explaining to others, challenging other views and reaching consensus, that helped learners learn. Tran (2013), drawing on Johnson and Johnson as well as Slavin (1983), saw cooperation as underpinned by theories of 'positive interdependence'; social interdependence theory (i.e. learners had to care

about the group and come to derive self identity from being a members of a group); and social theories of cognitive development, drawing at times on Piaget but more particularly the work of Vygotsky.

However there is more to collaboration than impact on learning gains. In particular there are contexts in which cooperative or collaborative learning may be particularly valuable notwithstanding any general stance. For example, forms of collaboration might assist professional preparation. This was something seen in Abercrombie's (1960) influential work in medical education and in later cases of inter-professional cooperation (for example, Tsakitzidis et al. 2015 and Olapade-Olaopa et al. (2014), in respect to international partnerships). Other fields in which collaboration has an obvious appeal have often involved literacy (e.g. Bruffee 1999) and language learning (see Stahl et al. 2006; Warschauer 1997) indicating an obvious association between collaboration and the development of language fluency. There is too a more general case that collaboration develops important, but not easily defined, learning outcomes such as employability and transferable skills needed for the knowledge society as, for example, in Bindé (2005) and Mezirow (1997), in the context of adult education.

A further part of Johnson and Johnson's original argument was that working together could lead to the development of social skills such as turn taking and active listening and Slavin (1990) felt too that there were affective and motivational gains associated with cooperation as well as cognitive ones. On a broader canvas the experience of collaboration is often seen as 'empowering' in the sense of developing a belief in one's ability to make decisions and influence institutions. Empowerment, as Juceviciene and Vizgirdaite (2012) argue, requires a different role for teachers, one in which they are exercising power *with* students rather than a power *over* learners. Empowerment has been particularly associated with self-help groups (e.g. Israel et al. 1994 in the context of community health) but also with political activism as seen, for example, in 'settlement movements' (as pioneered by Addams, [1910] 1990 in USA) and in 'Freirian' emancipatory pedagogy (Freire 1974). Collaboration might, in addition, help generate empathy across divided groups and communities, an approach strongly associated with Lewin's experiments in addressing anti-Semitism in USA (Lewin, [1951] 1997). This was taken up in the 'contact hypothesis' of Allport ([1954] 1979) and revisited in cases such as Molloy and Lavie's (2001) study of cooperation across divided Israeli and Palestinian communities and Austin et al.'s (2015) efforts to normalise cooperation in divided school communities in Northern Ireland.

Finally, collaboration is often seen as a more natural approach to learning, with Johnson et al. (1998) noting how cooperation, rather than rugged individualism, was core to American rural life as well as to contemporary achievement in sporting and academic teams. Smith (1988), in work on reading but with wider appeal, argued that education had 'backed the wrong horse' in offering a view of learning based on psychology, or a form of psychology that was prominent at that time, as this was focused on individual achievement and on the endless, and, unproductive, measurement of such achievement. Smith argued it was more natural to learn together – the idea of a learning club – albeit collaboration needed to be carefully developed and attuned to cultural context. Smith's argument was later echoed in Lave and Wenger's more widely cited work on situated learning and apprenticeship in a Community of Practice. This proposed a 'cultural anthropological' view of learning (e.g. Lave 1991; Wenger 1998;

Lave and Wenger 1991) describing the process of enculturation which enabled, for example, midwives and tailors to become full participants in a community of practice.

2.2 Collaboration and knowledge building

Cooperative and collaborative learning raises fundamental questions regarding epistemological / ontological dimensions of knowledge - the two being very difficult to separate (Crotty 1998). In the context of language teaching, but often cited for its more general significance, Oxford (1997) saw cooperative learning as concerned with particular classroom techniques that fostered learner interdependence but collaborative learning as having a full 'social constructivist' basis. Collaborative learning unsettles objectivist assumptions about knowledge (see Bruffee 1999) and it is not surprising that growing interest in collaboration, particularly from the 1960s onwards, ran alongside a challenge to positivist assumptions about natural science (Kuhn ([1962] 2012), and greater scepticism about the value of 'propositional knowledge' (e.g. Schön 1983, in respect to professional practice and Glaser and Strauss 1967, in respect to social theory).

There is too a more normative dimension to collaboration and this was captured most influentially in Dewey. For Dewey it is through language that we create social lives, learning is in itself necessarily communicative:

To be a recipient of a communication is to have an enlarged and changed experience. One shares in what another has thought and felt and in so far, meagerly or amply, has his own attitude modified. Nor is the one who communicates left unaffected. Try the experiment of communicating, with fullness and accuracy, some experience to another, especially if it be somewhat complicated, and you will find your own attitude toward your experience changing; otherwise you resort to expletives and ejaculations. The experience has to be formulated in order to be communicated. To formulate requires getting outside of it, seeing it as another would see it, considering what points of contact it has with the life of another so that it may be got into such form that he can appreciate its meaning. (Dewey 1916 [1947]: 12)

Here Dewey is advocating what he called democratic education not just for its efficacy but for the personal growth that comes from engaging with others and articulating one's own view point. For Dewey learning was a process of coming to share an inter-subjective world (Dewey 1910); to be intelligent was to be socially intelligent and this meant learning one's own position in relation to others:

But suppose that each becomes aware of what the other is doing, and becomes interested in the other's action and thereby interested in what he is doing himself as connected with the action of the other. The behaviour of each would be intelligent; and social intelligent and guided. (Dewey [1916] 1947: 37)

Dewey's work continues to be important as it introduces a wider argument: only through collaboration do we develop intersubjective knowing, democratic habits and public spiritedness. His influence has been long lasting in education as seen, for

example, in Thelen's (1960) influential work into group based inquiry and collaborative action research (e.g. Elliott 2007).

2.2.1 *Strategies and challenges for collaboration*

Collaborative learning may be introduced on an ad hoc basis, for example, episodes of peer discussion in seminars and lecture rooms, but discussion of collaboration has often been dominated by questions of learning design. These questions have often covered the role of assessment and, in particular, that of peer assessment (e.g. Johnson and Johnson 1989) but also the design of learning tasks as in problem based learning (PBL) (Hmelo-Silver 2004); reciprocal teaching (e.g. Brown and Campion 1995) and inquiry based learning (e.g. Windschitl 2003). In different ways these approaches provide learners with problems to work at together - often open ended ones that invite a range of possible solutions. They often involve a change or alteration of teacher and student roles too. Typically tutors will help facilitate group work, for example introducing students to problem solving strategies and encouraging them to reflect on not just what they have learnt but how they have learnt it. Students are expected to take more responsibility for their own learning.

Collaboration is not straightforward and Juceviciene and Vizgirdaite (2012) saw four key challenges: context; content; educator; learner. These challenges are covered extensively in the literature. For example Johnson and Johnson were in no doubt that cooperative approaches to learning were natural but not natural to many educational systems due, in good part, to the persistence of individual assessment and institutional inertia. Collaboration did not always come easily to learners. For example, Dewey ([1938] 1963) noted that learners came with past habits that might inhibit working together and Slavin (1983) argued that if learners were responsible for their learning then social and interpersonal skills needed to be taught, not assumed. Teachers needed to think carefully about changes to learner rewards and teaching structures but might be resistant to making such changes.

There are further concerns as to whether a reasonable degree of symmetry can be expected in respect to roles, status and knowledge in group work as opposed to one person doing all the work for the group or individuals within a group finding that their contributions are ignored. Symmetry, as Dillenbourg (1999) pointed out is not the same as homogeneity and groups may well benefit if members have different viewpoints based on their personal experiences and knowledge. Indeed collaborative learning is predicated on, first, that such differences exist and, second, that their very existence sets up a productive learning context.

Collaboration rests on a level of optimism over the ease with which learners are able to work together but it is, to a certain extent 'invitational' rather than something that can be 'delivered'. This imposes constraint though it is also worth noting that if collaboration cannot be guaranteed in a context in which it is promoted, it cannot be excluded in a context in which it is not. For example, some individuals in almost any circumstances have particularly strong dispositions to work together and these dispositions are embedded in some cultures, as argued by Bruffee (1999: 19). Intense collaboration may take place in unlikely settings. For example, Mandela (2008), when imprisoned on Robben Island, described the experience of the correspondence course, a much criticised transmission model of teaching, as intensely felt at both a personal and

shared level. Donge (1999) too showed distance learning may provoke patterns of collaboration outside of formal learning, in this case among farmers in Tanzania, and recently Adams and Yin (2015) unexpectedly found collaborating face to face child – parent pairs of learners while researching Moocs.

3 The why and how of online collaboration

There has been a close connection between educational use of technology and collaborative learning and this is signalled in conceptual labels or movements such as *computer-supported cooperative work*; *computer-supported collaborative learning* and strongly implied in terms such as *networked learning* (Fowell and Levy 1995) and *connectivism* (e.g. Siemens 2005) and perspectives on learning within Moocs (e.g. Conole 2013). Crook (2011) argued that this association was generated at a time when a shortage of computers required students in the classroom to work together. This is intriguing but probably more significant were the changing attitudes to learning and to knowledge (its generation and ontological status) in the 1960's and beyond. What is striking is that technology, once perceived as oppressive and affirming hierarchies of power (e.g. Marcuse, [1964] 2013) became in time reconstructed as an asset for counter cultural thinking and a support for creativity and collaboration (e.g. Matei 2005). This led many educational reformers to associate the introduction of technology with pedagogical change and to paradigm shifts in teaching and learning (e.g. Harasim 2000; Hodgson et al. 1987; Mason and Kaye 1989; Siemens 2005; Webb 2014 and so on). As Gunawardena et al. (2009: 5) put it, technology challenges existing learning theories 'primarily because the theories were developed when wide-ranging online communication between people of different races, locations, and viewpoints was not possible.' Technology mediation provides opportunities for expanding the reach of collaboration, mixing media and access to past archives of interactions. Using technology, learners are seen as increasingly able to articulate ideas, receive feedback, tackle joint problems, and reflect on opinions and perspectives of others (particularly of peers) in ways that were not possible before the Internet, certainly in the context of distance learning.

3.1 Benefits of online collaboration

There is a widely expressed view that the learning gains evidenced by Johnson and Johnson, Slavin and others can be realised in an online context (e.g. Cecez-Kecmanovic and Webb 2000; Harasim 2000; Hrastinski 2009; McConnell 2000). Researchers have, further, provided experimental studies of their own (e.g. Roy et al. 2014), or more often constructed experimental and control groups in naturally occurring situations, to show that there are positive gains to be had in promoting OC (e.g. Hiltz et al. 2000 and the earlier, more qualified review of Lehtinen et al. 1999). There has too been a raft of broader investigation comparing online with f2f learning, with, for example, Cavanaugh et al. (2004) suggesting that the medium of 'virtual schooling' can be as effective as f2f schooling, and Means et al. (2009) showing gains through online as opposed to f2f teaching and learning – though greater gains in blended contexts.

The case for OC goes wider than learning gains and, as recent contributions to Hmelo-Silver et al. (2013) show, it is underpinned by both quantitative and qualitative research into the nature of learners' behaviour and interaction. Of course investigations of learner interaction is not new (see for example Mercer 1995 on pupil talk), but the automatic archiving of messages has made it much easier to chart the frequency and source of interactions as well as to carry out different forms of content analysis (see De Wever et al. 2006 for examples). Learning analytics, drawing in part on earlier social network analysis (e.g. Aviv et al. 2004), has helped to further evidence the networked nature of learning in particular by throwing light on less expected interactions away from the main site of learning – see for example Fournier et al. (2011) exploration of Twitter connections between learners and, more generally, Agudo-Peregrina et al. (2014).

As in the long view of collaboration outlined in the first part of this paper, OC is seen as developing important but not easily defined learning outcomes such as employability; transferable and 'twenty first century' skills (Facer 2011; Harasim 1996; Keane et al. 2014; Scardamalia and Bereiter 2006; Webb 2014); and fit with Castell's vision of a knowledge society. Again as with the earlier literature, there is a tendency to see OC as natural though this time because younger learners are disposed to be communicative with digital media based on their extensive experience of technology in informal learning contexts. Finally there are particular contexts that invite OC - as in Collings and Pearce's (2002) reporting of usability trials of web sites and Kavitha and Ahmed's (2015) study of paired programming, both in the context of developing IT knowledge and skills.

3.1.1 Learning and knowledge building online

OC, as with the long view of collaboration, is underpinned by social learning theory. Sfard (1998), in the context of the mathematics classroom, supplied two metaphors for learning. The first of these was learning by acquisition, in which the process of acquiring knowledge was an individual achievement. The second was the participation metaphor or learning through participation in a group. Here knowledge (a noun) is replaced with knowing (a gerund) to indicate action and to draw attention to the 'situatedness, contextuality, cultural embeddedness' in which learning takes place. It is this second metaphor which many supporters of OC have alighted upon and, as put by Hrastinski (2009), 'online participation drives online learning'. In other words participation is not an aid to learning or a scaffold for learning but it is learning in its own right: 'Participation and learning are argued to be inseparable and jointly constituting.' (Hrastinski 2009: 81).

Collaboration is crucial to learning because it is through effort of explaining and defending positions, exploring differences and reaching agreement, that new knowledge is created. For some, technology not only supports participation but provides participants with past archives which enable and represent knowledge sharing. Bonamy and Haugluslaine-Charlier (1995), for example, proposed a kind of just in time learning software enabling collaboration tools and access to 'databases' of public and private knowledge. Here the integration of the content of exchanges into a knowledge base enabled 'reification' of new knowledge (Bonamy and Haugluslaine-Charlier 1995: 197). In a similar vein, Murphy (2004) proposed that technology could support the

production of shared artefacts – again suggesting that knowledge creation online can result in tangible assets. Derry et al. (2006) reported on a suite of tools that offered to ‘emesh’ problem-based learning in reflective study of text and video and Scardamalia and Bereiter (2006: 104) designed software to ‘capture the flow of information in the classroom, so that questions, ideas, criticisms, suggestions, and the like were contributed to a public space equally accessible to all, instead of it all passing through the teacher or (as in e-mail) passing as messages between individual students’. This again enabled tangible expression of new knowledge - in this case through a joint hypertext.

For some, Dewey has remained an important reference point. Drenoyianni (2006) suggested one implication from Dewey was that teachers should promote participatory approaches to teaching and learning and seek to promote the growth of the classroom community to which learners belong. This was not an argument in itself for technology but Drenoyianni saw a value in using communication technology to broaden the audience and means of expression, so providing more opportunity for interaction and meaning making. Here, technology can assist but the ontological and ethical arguments came first. Similarly, Higgins (2001), from a Deweyian perspective, argued that ICT tools could assist learners in taking a more active approach to meaning making though such use was not ingrained in the software or easily enacted by teachers. While for Nordkvelle and Olson (2005) the continuing value of Dewey’s contribution was to show that the use of technology was a political matter so that ethical rather than instrumental choices needed to be made in considering its adoption.

However there is not a unified view of the nature of knowledge or the process of knowledge building within the literature. For example, widely cited work by Salmon (e.g. Salmon et al. 2010; Salmon 2013) offered a loose idea of collaboration. In this five-stage model participants start with an initial orientation to working online and establishing an online identity. Only as participation and confidence increase may learners look for deeper exchange and seek help in achieving their own learning goals, transferring and applying their online activity to learning. This is collaborative knowledge building of a kind, but looks more a model of individual learning in a collaborative context rather than a joint construction of artefacts and databases.

3.1.2 Strategies and challenges for online collaboration

OC researchers have been aware of the need for structuring participation. Salmon, above, stressed a staged immersion into collaboration but others have built in collaborative design from the start. For example, Derry et al. (2006) argued for an PBL approach; Garrison et al. (2010) suggested that designers set up a community of inquiry; and McConnell (2000) made peer assessment central to design.

OC has been facilitated by wider access to online technology which has meant that many, but by no means all, have continuous Internet access and social networking is now commonplace. However those promoting OC in education routinely note the challenge of adoption (e.g. Gan et al. 2015) including in distance education where the argument for networking learners has probably been more compelling (e.g. Crook 2011). Constraints on adoption match those reported by Juceviciene and Vizgirdaite (2012) earlier: contextual issues include individual, rather than group assessment; weaknesses in policy and leadership of change; limited support for teachers or instructors (e.g. Blin and Munro 2008; Selwyn 1999; Timmis 2014). Many of these issues

resonate with a wider literature on the constraints of using technology and the nature of its promotion in education (e.g. Selwyn 2014).

4 A comparison between the longer view of collaboration and its promotion online

An explicit comparison between perspectives on OC and the traditional or ‘long’ view of collaboration shows much in common in respect to theoretical underpinning; environmental opportunities and constraints; approaches; benefits; and methods of evaluation (see columns two and three in Table 1). In particular from both perspectives collaboration is often seen as providing a mix of benefits including increased levels of cognitive achievement along with motivational /affective gains and development of generic skills. Further, all attempts to promote collaboration have taken place in contexts which provide both opportunities and constraints. All collaboration is seen both as natural (though for differing reasons) but requiring attention to rewards and structure. Nearly all those writing about the underpinning of collaboration argue for, or tacitly accept, anti-objectivist perspectives of knowledge and offer social views of learning in which the role of the teacher is rethought. As Table 1 summarises technology may expand reach, as well as provide particular opportunities in respect to use of media and archiving, but OC is not in essence new even if its mediation is. The argument that OC presents a paradigm shift in learning, still less that it requires a new theory of learning is largely unconvincing (see Clarà and Barberà 2013).

One reason that technology does not in itself disrupt teaching and learning is that, as Nardi and O’Day (1999) argue, it is always used in a social cultural context and adapts to existing habits and orientations to teaching and learning. Technology of course has consequences, but it cannot be assumed that technology is being used in the way its designers intended or that the affordances inviting collaboration, which so impressed earlier writers on educational technology, are noticed by students. For example, many of the pioneers of Virtual Learning Environment (VLE) design had a learner centred, and at times explicitly ‘constructivist’, view of teaching which they were keen to promote (e.g. Dougiamas 1998). VLEs were intended in many cases to support curriculum change, in particular providing a tool for addressing learner isolation and lack of interactivity. In practice, however, their use has tended to prioritise access to information over collaboration (see, for example, Blin and Munro 2008) and in spite of their supposed benefits technologies may end up offering ‘more of the same’ (Selwyn 2014: 45).

5 Where next for online collaboration?: Criticism and recalibration of an argument

A future agenda for OC needs to address the criticisms made of both collaboration in general and OC in particular. This is not straightforward as those who criticise collaboration approach it from different directions. For example ‘traditionalists’ find Dewey’s view of collaboration excessively child centred (see Petrovic 1998) and ‘neo

Table 1 Comparison of perspectives on online collaboration with the longer view of collaboration

Aspect	Collaboration: the long view	Online collaboration
Theoretical underpinning	Knowledge as socially constructed, (e.g. Oxford 1997); learning as participation (e.g. Lave and Wenger (1991); intersubjective knowledge building (e.g. Dewey and Habermas); social constructivism and mutual interdependence (e.g. Tran 2013); contact hypothesis (e.g. Austin et al. 2015).	Knowledge building (e.g. Scardamalia and Bereiter 2006); knowing through consensus (e.g. Bonamy and Haugluslaine-Charlier 1995; Boyd 1996); ideal speech conditions (e.g. Cecez-Kecmanovic and Webb 2000); learning as participation (e.g. Hrastinski 2009).
Environmental opportunities and constraints	Asymmetry offers opportunity for exchange but can be dysfunctional (e.g. Dillenbourg 1999); culture, context teachers and learners offer both encouragement and constraints (e.g. Juceviciene and Vizgirdaite 2012); some contexts particularly suitable (e.g. Abercrombie 1960; Bruffee 1999).	ICT offers opportunities to expand reach (e.g. Siemens 2005), mix of media (e.g. Derry et al. 2006) and access to archives (e.g. McConnell 2000). Natural approach for many younger learners. Uptake of ICT constrained by environment or 'activity system' (e.g. Timmis 2014) and by nature of its promotion (e.g. Selwyn 2014).
Approaches	Rewards and structures needed; modelling of group tasks (e.g. Slavin 1983) and group assessment (e.g. Johnson and Johnson 1989); PBL, inquiry based learning and reciprocal teaching promoted (e.g. Brown and Campion 1995; Windschitl 2003).	Rewards and structures including PBL (e.g. Derry et al. 2006); staged knowledge sharing (e.g. Salmon et al. 2010); production of joint artefacts (e.g. Murphy 2004); guided interaction (e.g. Collings and Pearce 2002).
Benefits	Learning gains (e.g. Johnson and Johnson 1989); motivational gains (e.g. Slavin 1990); a natural approach (e.g. Smith 1988); suited to knowledge society; empowerment (Juceviciene and Vizgirdaite 2012); empathy and social understanding (e.g. Austin et al. 2015).	Fit with information society and 21st century skills (e.g. Facer 2011; Keane et al. 2014); motivating and natural approach; knowledge building (see theoretical underpinning).
Evaluation	Mix of approaches but historic importance of evidence from systematic review (Johnson and Johnson 1989), use of experimental and control groups (eg Lewin [1951] 1997).	Mix of approaches, historic importance of experimental approaches (e.g. Hiltz et al. 2000); learning analytics (e.g. Fournier et al. 2011).

conservatives', such as Hirsch (2010), argue that education should focus on covering a common core curriculum. In contrast, and from another direction, Dewey is seen as sociologically naïve (Wilkinson 2012) and for some his implications for teaching and learning are too cautious. Another line of criticism is to accept the grounds for

collaboration ‘in principle’ but argue that it is particularly difficult to achieve in practice or else will not suit particular groups of learners (see, for example, Li and Adamson 1992, in respect to very able learners, and Iovannone et al. 2003 who argued that there were benefits in systematic instruction and high level of individual support for learners with autism spectrum disorders). Others might argue that all teaching, including quite instructional teaching, is in a sense collaborative in that an engagement with any text broadens one’s experience and enables participation in an imagined community. In that sense collaboration takes care of itself.

This paper cannot address all these criticisms. Instead, it is broadly accepted that there are substantial benefits from collaboration but that there are weaknesses in its promotion to which it is worth drawing attention. Three problems stand out and they concern weaknesses in: the instrumental perspective on collaboration; the normative perspective; the view of learning as social participation.

5.1 Weaknesses within the instrumental perspective on collaboration

Instrumental and normative perspectives start from different places. The instrumental perspective looks for objective evidence of impact through the measurement of learning gains. Illustrative of this perspective have been the use of systematic review, which was central to the work of Johnson and Johnson, Slavin and others; experimental methods; and, more recently, learning analytics. These have allowed a considerable marshalling of evidence. However, less often aired, is that not all evidence on collaboration points the same way. For example the much-cited research of Hattie (2013) suggested that key to learning was feedback while cooperative learning was a positive intervention, Hattie did not offer the same ringing endorsement as Johnson and Johnson. In similar vein, and using a learner analytics methodology, Agudo-Peregrina et al. (2014) showed the value of peer interaction in relation to assessment outcomes and retention but also showed the enduring importance of teacher – learner interactions. Further issues arise in regard to experimental methods in that meaningful work comparing outcomes in online / off line contexts has become increasingly difficult and unhelpful. As Lehtinen et al. (1999) and more recently Timmis (2014) recognised, the research on OC often concerns short-term innovations and when compared to f2f classrooms online learning appears a messy and uncontrolled setting (see Lehtinen 2003).

A rather different line to the instrumental perspective on collaboration, particularly OC, is to stress its suitability for developing the skills needed for a networked knowledge economy. In other words what is being recommended about collaboration is the utility of the outcome rather than the process itself. However the argument on transferable skills is not wholly convincing. While there have been changes in professional practice that really do seem to require higher levels of collaboration, not least in the field of teacher education (e.g. Hargreaves 2003), these changes are not universal. In fact contemporary labour markets demand a very differentiated mix of knowledge and skills, in some cases a very low level of skills indeed. Much in the discourse of the knowledge society, and the type of education that best fits it, has been distorted by wishful thinking about market requirements and influenced by ‘rose tinted’, future narratives (see Peters 2001).

5.2 Weaknesses within the normative perspective on collaboration

In contrast to the instrumental perspective, the normative perspective on collaboration (drawing strongly on Dewey) stresses that core to learning is the reaching of warranted intersubjective agreement, the capacity each has for mutual recognition and awareness of shared reflective consciousness. Dewey and others called for a ‘democratic’ education on wider grounds than vocationalism. If this view is accepted it shifts the debate from ‘What works?’ (collaboration as a means to an end) to ‘What is ethical and ontologically valid?’ (collaboration as an end in itself). The only questions worth asking about collaboration are, not whether it leads to better learning outcomes, but how best to promote collaboration in the first place, and how to create a communicative process that is both rigorous and democratic.

This normative view is, however, open to critique precisely because it is normative; it is assuming, albeit with appeal to historical sources, that education is fundamentally concerned with goals such as a empowerment, emancipatory learning and democratic practice when others might, and frequently do propose, other goals such as knowledge of facts and acquisition of functional skills. Furthermore, critics point out that it is reasonable to question whether learners who are being empowered have asked for such empowerment in the first place; ‘power with’ may be empty rhetoric.

5.3 Weaknesses within the view of learning as always social

Those writing about collaboration agree to varying degrees that learning is social. This historically has been a particularly useful standpoint as it shifts the study of achievement to the quality of social interaction rather than effort, innate ability or personal resilience alone. As put by Pea (1993: 48–49), in respect to distributed learning, we are moving away from ‘intelligence’ as an attribute of individuals, ‘carried primarily in internal transformations of mental representations of symbols of goals, objects and relations’ towards the artefacts which are ‘in constant use for structuring activity’. So far so good. However it is intuitively obvious too that learning is *also* a personal achievement, a point well made and without irony, by Salomon (1993: 114) in discussing the very individual and internal process of writing alone at his desk about distributed learning. In the same vein Dillenbourg (1999) saw learning as involving a kind of internal dialogue or ‘collaboration with oneself’ as did Vygotsky in discussing egocentric speech. Indeed Vygotsky is justifiably enlisted in support of collaboration when arguing that ‘higher psychological function’ begin with the stimulus of external activity (Vygotsky [1994]: 153). However the point for Vygotsky was that these functions need to be interiorised, that is separated from the context in which they were first developed. This strongly implies that learning is achieved *also* at an individual level (see Van der Veer and Valsiner 1994).

5.4 Recalibrating the argument for OC

Those seeking to recalibrate the argument for OC are challenged to address the weaknesses above and there are ways of doing this. As to the last of the three criticisms, it is not difficult to present a picture of learning as both individual and social and to agree with Sfard (1998) that there is danger in identifying two metaphors

for learning but choosing just one. Arguably this integration of social and individual perspectives on learning is achieved in Vygotsky. More difficult is to address the first and second criticisms. One means of doing so is to highlight the strengths of the normative and instrumental perspectives but see them as complementary, in other words to acknowledge the importance of evidence of impact but also to recognise that collaboration, OC or otherwise, is shaped by educational values, values which need to be articulated and reflexively critiqued. In practical terms this means that all evidence about outcomes will need to be considered but done so in respect to its 'discursive location' (Clegg 2005) and in recognition of its limitations. As regards collaboration the danger is having incompatible stances on knowledge and knowledge building. The instrumental view of collaboration, lying within an objectivist / positivist tradition, assumes that there are generalisable recommendations for practice based on comparative analysis. In contrast, the normative view takes knowledge as provisional, contextual and needing to be constructed through social interaction. A strategy for reconciliation is to take the evidence provided by objectivist methodologies as workable hypotheses, rather than recommendations, about collaboration which need to be explored, and if necessary discarded, in particular contexts.

5.5 Towards a differentiated view of collaboration

Underlying the problem of promoting OC is the need for a more differentiated account of learning and knowledge building. Of course such differentiation already exists in the well-worn distinction between collaboration and cooperative learning seen earlier, but there is an opportunity to present a more general distinction between weak and strong forms of collaboration (see Lehtinen 2003), based in part on the strength of ties between learners (e.g. Norris 2002). Weak tied collaboration seems capable of organic growth in otherwise formal learning setting as Goodband et al. (2012) discuss in the case of Facebook groups to support students of mathematics and Lai and Gu (2011) in considering online support for language students. Weak networks often emerge under the radar of institutions and instructors (e.g. Adams and Yin 2015; Dabbagh and Kitsantas 2012), though more could be done to support them. Of course informal collaboration may even under supportive conditions fail to take off but this should not led to a loss of esteem for designers. The case for weak collaboration need not be all encompassing and may include motivational gains, developing social identity and the value of sharing information. Siemens's (2005) presents the case for weak tied collaboration well by drawing attention to the myriad ways in which learners are connected and can share ideas:

Weak ties are links or bridges that allow short connections between information. Our small world networks are generally populated with people whose interests and knowledge are similar to ours. Finding a new job, as an example, often occurs through weak ties. This principle has great merit in the notion of serendipity, innovation, and creativity. Connections between disparate ideas and fields can create new innovations.

However, Siemens goes on to argue that 'learning (defined as actionable knowledge) is focused on connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing.' This is

much more problematic. More is implied in coming to know than picking up, what Siemens describes as, ‘chaotically ordered’ information in open networks and while connectivism may draw attention to new strategies for learning this does not make the case that a new learning theory is required (see Kop and Hill 2008).

In contrast to weak forms, strong forms of collaboration such as PBL and group assessment set the bar much higher in respect to levels of participation and evidence of knowledge building. Here instructors and evaluators would be expected to show evidence of regular interaction and symmetries in interaction patterns; it would matter greatly if social interaction failed to take off or if interaction was dominated by some and other voices were not heard. Those promoting strong collaboration would need, further, to be clear about the criteria by which the quality of any new knowledge can be judged, rather than fall back on the argument that learning has taken place because there is evidence of participation. In providing such criteria there are some helpful propositions about knowledge on which to draw.

One proposition about knowledge is that it should correspond to validated discipline knowledge. This appears to introduce quite objectivist assumptions about knowledge (‘Does the knowledge created correspond to reality?’) but the correspondence could simply be to what a community holds to be important at a particular time, or to logical consequences of rule based inquiry, rather than immutable facts about the world. For example in discussing knowledge building in virtual maths teams Wee and Looi (2009) are able to chart a process based around language functions such as making suggestions, disputing and reaching agreement. These language functions are discussed in the context of discipline knowledge, for example ‘Are learners following recognised mathematical problem solving strategies?’, ‘Are their arguments logically true?’, ‘Are they introducing facts which are mathematically correct? This is a coherent and operationalisable strategy for evaluating collaboration and enables researchers to distinguish between valid and invalid arguments. It offers a means of tracking a genuinely knowledge building process and would not need not be confined to one particular context. However a limitation of the approach is that it is wedded to a correspondence view, the knowledge created is new to the group but not ‘new knowledge’ as such. This can be contrasted to a more radical stance in other writers such as Scardamalia and Bereiter (2006: 98) who see knowledge creation in their classroom as distinctive and as:

encapsulated by the comment of a fifth-grader on the work of a classmate: ‘Mendel worked on Karen’s problem’ (referring to Gregor Mendel, the great 19th century biologist). Not ‘Karen rediscovered Mendel’ or ‘Karen should read Mendel to find the answer to her problem.’ Rather than being overawed by authority, or dismissive, they see their own work as being legitimated by its connection to problems that have commanded the attention of respected scientists, scholars, and thinkers.

This is a far more ‘profane’ view of discipline knowledge but one that raises the kinds of questions over validity of knowledge (in what sense can it be said that learners’ work is ‘legitimated’?) which Wee and Looi are able to avoid.

A second justification for knowledge validation is a more pragmatic one, ‘Do the solutions generated by the group work in practice?’. Here the original Community of

Inquiry model (CoI) (Garrison 2007) envisaged a mixing of online and offline inquiry. Drawing on Dewey, an inquiry was seen as entering different phases: an initiation phase / triggering event; an exploration phase in which participants ‘shift between the private, reflective world of the individual and the social exploration of ideas’; a third phase of integration, in which the applicability of ideas is considered; and a final phase the resolution of the dilemma or problem by means of direct or vicarious action. The criterion by which the success of an action could be judged was its consequences in practice with a process of knowledge validation in the online community. It is a subtle and promising argument but difficult to exemplify. Furthermore it might leave the online community with a rather weaker role (‘community mindedness’ rather than ‘community of learners’, Santos and Hammond 2008) with the real knowledge creation taking place off-line. Hence it is not surprising that discussion of CoI became focused on types of online presences (see Garrison et al. 2010) rather than its relationship to off line participation. Nonetheless this action oriented inquiry may yet have particular appeal for those undertaking inquiry into collaborative practice in the future.

A third criterion for judging knowledge creation is to examine the rigour and ethical depth of the communication process carried out. The obvious source of reference here is Habermas (e.g. Boyd 1996; Cecez-Kecmanovic and Webb 2000) and his proposition that there can be a collaborative search for truth in a kind of ideal speech situation (ISS) in which those with competence are allowed to speak, no one is constrained in speaking, all are allowed to question the grounds for any assertion and new assertions could be put forward (Habermas 1990: 58). Here Habermas’s distinction between instrumental and strategic orientations to communication and reaching consensus is important (see Mezirow 1997). A strategic orientation is one aimed at exercising power over others, based on a distorted understanding of the world and / or protecting one’s own group interest; an emancipatory orientation required an intense effort to see other view points, to understand the partial nature of one’s own understanding and reach a consensus in something that approached an ISS (Habermas 1990).

Habermas provides a lens through which to critically review the process of knowledge creation, bringing in strong ethical considerations. However his key concept of an ideal speech situation is very difficult to exemplify and some would argue too that it offers an almost endless invitation to discuss rather than the action oriented inquiry of the CoI.

6 Conclusion

To summarise, the case for cooperation and collaboration is based upon an idea that having students work together will lead to more positive learning outcomes and more engaged learners. This is because there are processes in collaboration which make an identifiable contribution to learning and may be considered as learning in their own right. Collaboration offers a more relevant experience for learners and one that chimes better with the contemporary world; the relentless focus on individual achievement is not the natural way of learning but an early modernist aberration.

Online collaboration, it is argued, involves a change of environment for learners with consequences in particular for reach, media and archiving of interaction. However OC should be seen as an evolution of a tradition rather than a paradigm shift in teaching and learning.

Collaboration, and OC in particular, carries many reported benefits but there are inconsistencies or at least tensions in its promotion. In addressing these tensions it is suggested that the normative case for collaboration should be better signalled and there needs to be understanding that learning is both an individual and group achievement. Those promoting OC might look to clearly differentiate between strong and weak forms of collaboration and the kind of evidence of knowledge building that each requires.

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